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Data Sources and Methods for the Status of Major Fish Stocks Indicator

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1 Introduction

The Status of Major Fish Stocks indicator (<http://www.ec.gc.ca/indicateurs-indicateurs/default.asp?lang=en&n=1BCD421B-1>) is part of the Canadian Environmental Sustainability Indicators (CESI) program (<http://www.ec.gc.ca/indicateurs-indicateurs/default.asp?lang=En&n=47F48106-1>), which provides data and information to track Canada's performance on key environmental sustainability issues. This indicator is also used to measure progress towards the goals and targets of the Federal Sustainable Development Strategy (<http://www.ec.gc.ca/dd-sd/default.asp?lang=En&n=CD30F295-1>).

The long-term maintenance of the ecological, social and economic value of fish stocks requires an understanding of the status (biological health) of those stocks. It is the goal of Fisheries and Oceans Canada to ensure conservation, sustainability and economic prosperity by managing the fisheries using the Precautionary Approach.¹ This indicator measures the status of major fish stocks.

2 Description and rationale of the Status of Major Fish Stocks indicator

2.1 Description

Stocks are subpopulations of a particular species of fish, for which factors such as growth, recruitment, and natural and fishing mortality are the only significant factors in determining population dynamics, while other factors such as immigration and emigration are considered to be insignificant. A fish stock can be managed as a unit.

The Status of Major Fish Stock indicator classifies stocks into "healthy", "cautious" and "critical" categories, as outlined in the *Fishery Decision-Making Framework Incorporating the Precautionary Approach* (2009) (the precautionary approach) (<http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/fish-ren-peche/sff-cpd/precaution-back-fiche-eng.htm>).

For those stocks in the **healthy** zone (i.e., above the "upper stock reference point", which is determined by the productivity objectives of the fisheries), fisheries management decisions and harvest strategies are designed to maintain fish stocks within this zone, while providing sustainable economic, social and cultural benefits.

For fish stocks in the **cautious** zone (i.e., between the "upper stock reference point" and the "limit reference point"), decisions and strategies promote stock rebuilding to the healthy zone.

In the **critical** zone (i.e., below the "limit reference point", which is the stock level below which productivity is sufficiently impaired to cause serious harm to the resource but above the level where risk of extinction becomes a concern), stock growth is promoted and removals are kept to the lowest possible level.

¹ Fisheries and Oceans Canada (2009) *A Fishery Decision-Making Framework Incorporating the Precautionary Approach*. Retrieved on 10 October, 2013. Available from: <http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/fish-ren-peche/sff-cpd/precaution-eng.htm>.

2.2 Rationale

This indicator uses the Fishery Checklist, has begun in 2007 and has been revised over time to improve its usefulness as a management tool. In 2011, the Fishery Checklist and the set of major stocks considered were finalized for the period 2011-2014, allowing comparability between years. Changes prior to 2011 improved alignment with the Sustainable Fisheries Framework and other policies of Fisheries and Oceans Canada.

A standard set of 155 stocks established in 2011 is now part of the Fishery Checklist and will be used until at least 2014 to ensure consistent reporting. All stocks meeting the criteria for "major stocks" in 2011 are included, and no additional stocks were added in 2012. However, dogfish have been moved from the large pelagic group to the groundfish group to be consistent with the Integrated Fisheries Management Plans.

2.3 Recent changes

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3 Data

3.1 Data source

Data were drawn from evaluations of stock status that were reported in the Fishery Checklist version 4. The Fishery Checklist is an internal, self-diagnostic tool that provides a systematic review of progress on conservation and sustainable use objectives. The same Fishery Checklist is also used for the Sustainable Fish Harvest indicator (<http://www.ec.gc.ca/indicateurs-indicators/default.asp?lang=En&n=DC4B459E-1>).

The Fishery Checklist includes assessments or updates of the status of major stocks each year. This comprehensive checklist assesses fish harvest rates, bycatch, ecological impacts, stakeholder consultation and other activities, and includes the impacts of commercial, recreational and Aboriginal fisheries. The data provide a snapshot of a stock or fishery in time, capturing how a fishery is addressing a range of factors considered necessary for sustainable management.

3.2 Spatial coverage

Coverage is national, for all major fish stocks.

3.3 Temporal coverage

The Fishery Checklist has been completed annually since 2007. Checklist questions have been refined over this time period, and data from years prior to 2011 are not comparable. Since 2011, the Fishery Checklist questions have been finalized and will be maintained for four years (2011-2014), thus allowing comparisons over time to be made.

This indicator includes the status of stocks as assessed in 2012, and makes some comparisons to 2011 status.

3.4 Data completeness

All 155 major stocks were included in the Fishery Checklist for 2011 and 2012.

Major stocks are determined by regional managers and include all stocks that meet at least one of the following criteria:

- have an annual landed value greater than \$1 million;
- have an annual landed weight greater than 2000 tonnes;
- have an Integrated Fisheries Management Plan (<http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/ifmp-gmp/index-eng.htm>);
- are highly migratory or are transboundary stocks that are internationally managed;
- have been assessed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) (http://www.cosewic.gc.ca/eng/sct5/index_e.cfm) as being of special concern, and are subject to a directed fishery; and/or
- are deemed to be of regional significance.

These stocks include finfish, shellfish, marine mammals and marine invertebrates.

3.5 Data timeliness

Data for the Fishery Checklist in a given year are reported by April 1 of the following year; the indicator is current to the end of 2012. The "year" is defined variably, depending on how fishing seasons and closures are set for individual stocks, and may not align exactly with the calendar year.

4 Methods

The indicator is a tabulation of the number of stocks in each status zone: healthy, critical or cautious.

Stocks are "healthy" when the spawning biomass² is above the "upper stock reference point", which is determined by the productivity objectives for the fisheries. If stocks fall below the "limit reference point"³ (the stock level below which productivity is sufficiently impaired to cause serious harm but above the level where the risk of extinction becomes a concern), they are in the "critical" zone. Between these two points, the stock is classified as "cautionary". If reference points have not yet been established, zones are assigned based on the best available information on the fish's biology and its historic levels.

² The spawning biomass is the total weight of all the fish that engage in reproductive activity in a given season. It is affected by both the size and number of mature adult fish.

³ The "limit reference point" may also be referred to as the "lower stock reference point".

Stock assessments are conducted in a variety of ways and use many types of data, including abundance estimates and spawning biomass estimates. Many sources of data contribute to assessments, including data from monitoring fisheries (e.g., catch rates and fish body size distribution), research surveys, community knowledge and directed research.

Stock groups used for reporting on this indicator are marine mammals, salmonids, groundfish, large pelagics, small pelagics, crustaceans, molluscs and others. Each group comprises species with similar life history characteristics. For example, groundfish spend their adult life at or near the bottom of the ocean. These same groupings are used in the Sustainable Fish Harvest indicator.

5 Caveats and limitations

- The Fishery Checklist program was initiated in 2007. A number of changes have been made as the program has developed. In particular, the stocks included in the Fishery Checklist program have been changed and questions have been revised. A standard list of stocks and checklist questions are now established. Year-to-year comparisons are now possible between 2011 and 2012 results, but not to previous years.
- Fish populations are difficult to monitor. Fisheries and Oceans Canada uses a variety of scientific methods to assess stock levels, and the precautionary approach prescribes three "stock status zones" (healthy, cautious and critical) based on these scientific assessments of the stock level. However, information is sometimes incomplete.

The Fishery Checklist summarizes information across a wide variety of species, management regimes, types of fisheries, geographic regions, and socio-economic contexts. Results should be interpreted with this in mind.

6 References and further reading

6.1 References

Fisheries and Oceans Canada (2009) A Fishery Decision-Making Framework Incorporating the Precautionary Approach. Retrieved on 10 October, 2013. Available from: <http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/fish-ren-peche/sff-cpd/precaution-eng.htm>.

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